PAPERS

IN

CHEMISTRY.

TWENTY GUINEAS *were this Session voted to Mr.* R. WYNN, *of Wellington Place, Vauxhall, for Receipts for Enamel Colours, and for Staining and Gilding Glass. The following Communications were received from him on the subject, and Specimens of the Colours are preserved in the Society's Repository.*

SIR,

THE liberality of the Society in encouraging and rewarding communications in every useful art, induces me to offer to their notice a concise and compleat method of composing enamel colours. Painting in enamel colours has always been considered very interesting, and one of the most costly productions of art in every country where practiced; but the real preparation of the colours has always been confined to the knowledge of a few persons who have made a mystery of it, and whatever has been yet published on the subject,

appears to be chiefly the compilation of writers unskilled in the profession. Many artists of superior talents, in different parts of this country, could practise the art but for the difficulty of procuring a compleat set of good colours: indeed it is extraordinary with what suspicious secrecy the art of making the proper enamel colours has hitherto been conducted. I have been acquainted with several of the best manufacturers, whose colours were used by the most eminent painters on the finest and most elaborate works of the time, who have died without ever benefitting their country by publishing their acquirements, or leaving any documents behind them. By a continued perseverance in such secrecy, it is not impossible that the present improved state of knowledge in the art might, under unfavourable circumstances, be entirely lost, if some experienced professional person did not seek for an opportunity of making it public, and more generally useful. With these motives I take the liberty to offer the accompanying treatise, which consists of the most valuable selections from the experience and labours of above twenty years.

I am, Sir,
Your most obedient Servant,
ROBERT WYNN.

Wellington Place, Vauxhall,
March 11, 1817,

To A. AIKIN, Esq. Sec.

Introductory Remarks.

The different qualities or degree of purity in the ingredients as usually met with, will with the same prescriptions, produce some slight variations in effect, but the best enamel colours

colours may always be obtained with certainty by careful attention to the following receipts.

When metals are dissolved, the solutions should always be perfectly saturated. In making the fluxes, they should be sufficiently melted in the crucibles, so as to flow liquid and pour out easily.

The various qualities of the material, or surface, on which painting in enamel is performed, require the colours to be adapted to the degree of heat it will bear or require when burnt; and it is generally the practice of the best painters in enamel, to use for the first painting and burning, colours considerably harder than those used in the second painting and burning, the latter being fine soft enamels, in order to finish the work, and give a beautiful smoothness. It cannot but be obvious to every person who uses enamel colours, that the hardening them if necessary, will be effected by adding more of the colouring matter; or lessening the quantity of flux, and, if required to be more soft, or to shine more when burnt, to add a little more flux, and this is best done by a very soft flux generally used for this purpose, such as No. 8; but when particular directions are necessary, they will be found mentioned in the receipt for making the colour. It will be better to make a few ounces at least of each colour at a time, and they are all to be ground as soon as made in water, with a glass muller, or a piece of plate glass, and dried before the fire, then scraped off in powder, and kept in bottles for use.

When used in painting they are ground in spirits of turpentine, and thickened with thick oil of turpentine, which quality the fluid oil of turpentine acquires in three or four years.

Preparation of Ingredients

Flint Powder.

Take pieces of flint, which have been burnt white at the chalk lime burners (they may be had at the lime burners at Vauxhall,) make them clean with hot water and a brush; then throw them red hot into cold water; after having thus treated them two or three times, pulverize them in a biscuit-ware mortar with a pestle of the same, (which will be easily effected), and then grind them in water on plate glass.

Where no opportunity occurs of procuring burnt flints from the lime burners, the common black flints broken into pieces, made hot in boiling water (to prevent their flying in the crucible,) and treated in the same way, will produce a fine white powder.

Red Sulphate of Iron.

Sulphate of Iron, otherwise called Green Vitriol, is to be pounded and placed in an earthen ware muffle, (which may be had at the ironmongers, in Foster Lane; or at Mr. Accum's, in Compton Street) till the moisture is evaporated and a grey powder left: which place in a crucible in a charcoal fire, and stir it with a piece of steel bar, till it is of a fine red colour; then let it fall out of the crucible into a pan of cold water, under a chimney, to avoid the disagreeable fumes that arise; when settled at the bottom wash it in several hot waters, and then dry it for use. The more it is burnt, the darker the red.

Brown Sulphate of Iron.

Take sulphate of iron in lumps, and calcine it in a red charcoal heat; till it becomes of a dark brown, and let it cool in the crucible, afterwards wash it repeatedly in hot water.

Black

Black Oxide of Copper.

Take copper and dissolve it in aquafortis, till the acid refuses to take up any more metal; then dilute the solution with water, and add to it some sub-carbonate of potash, dissolved in water; a green precipitate will fall to the bottom, which must be washed in several hot waters; when settled, pour off the superfluous water, and place the green matter at the bottom on a piece of coarse open canvas, tied over a large earthen pan, on which a piece of blotting paper is laid; after the precipitate has been thus drained, it should be taken off and made perfectly dry, by placing the paper on a drawer of powdered chalk to absorb more of the moisture, and then placed before the fire. When dry, calcine it in a crucible in a charcoal fire, and throw it red hot into cold water; then rince it in boiling water, and dry at the bottom of the bason before a fire; what remains is a beautiful black oxide of copper.

Green Oxide of Copper.

Take a saturated solution of copper in aquafortis, and precipitate it with sub-carbonate of potash; then wash it several times in boiling water, filter and dry it

White Oxide of Tin.

Into a small wooden box with a sliding cover, chalked over on the inside, pour melted tin from a ladle, and shake the box till the tin becomes finely granulated; then wash it and dry it, and put it into a Florence oil flask, and pour over it strong nitrous acid, which rapidly converts it to a white powder. When a sufficient quantity of this is obtained, it should be well washed in several boiling waters, poured out into a bason, and dried before the fire;—it then produces a very white oxide of tin.

Black Oxide of Cobalt.

Take good metallic cobalt *, and dissolve it to saturation in nitric acid diluted with a little water, in a flask placed in sand over the fire; then pour it in a large bason, and having added a quantity of water, pour in a solution of sub-carbonate of soda, as long as any precipitate falls down: when settled pour off the water, and wash the powder in several hot waters, filter it and dry it: When dry, mix it in a biscuit ware mortar with a pestle of the same, with three times its weight of dry nitre; place it in a warm crucible, and drop in an ignited piece of charcoal: some slight explosions will then take place, and when these have ceased, make the calx red hot; this after being washed and dried, produces the best oxide of cobalt for enamel; and capable of making and compounding various colours.

Fluxes.

Take great care to mix all the ingredients accurately together, in a biscuit-ware mortar, with a pestle of the same, and to have them all pounded as fine as possible. Let the crucibles be made warm before the fluxes are put into them, (by placing them on the fire with the open end downwards,) which will prevent most of the accidents which happen by their breaking in the fire.

The best furnace for making fluxes, or for any other process that requires great or continual heat, is a common german stove about 18 or 20 inches inside, lined all round from the grating to the top, (except the aperture at the door in the front for the occasional introduction of a muffle,) with

* In the choice of cobalt, that which when dissolved in nitric acid, gives the purest and deepest red solution generally makes the finest colours.

one

one row of fire-bricks set with loam; the iron-pipe chimney projects from the back part near the top. The top or cover of the furnace, to be loose like a lid, and removable by handles; in the center of it a circular hole is cut out, which is also fitted with a cover through which the top of the crucible may be lifted off, and its contents be stirred up with a bar of steel. A small piece of fire-brick is placed on the grate, for the crucibles to stand on, and the fuel should be charcoal and coke mixed, or charcoal alone.

Flux, No. 1. red lead 8 parts by weight,

	*Calcined borax	1½
	Flint powder	2
	Flint glass	6
No. 2,	Flint glass	10
	White arsenic	1
	Nitre	1
No. 3,	Red lead	1
	Flint glass	3
No. 4,	Red lead	9½
	Borax not calcined	5½
	Flint glass	8
No. 5,	Flint glass	6
	Flux, No. 2,	4
	Red lead	8
No. 6,	Flux, No. 2,	10
	Red lead	4
	Flint powder	1¼
No. 7,	Flux, No. 4	6
	Colcothar	1

* Borax calcined to a dry white calx in a crucible, only a third part of which should be filled at once, on account of the borax swelling so much as it gets hot.

No 8,	Red lead	6
	Borax not calcined	4
	Flint powder	2

After the fluxes have been melted, they should be poured on a flag-stone wet with a sponge; or into a large pan of clean water, then dried, and finely pounded in a biscuit-ware mortar for use.

Yellow Enamels.

Red lead	8
Oxide of antimony	1
White oxide of tin	1

Mix the ingredients well in a biscuit-ware mortar, and having put them on a piece of Dutch tile in the muffle, make it gradually red hot, and suffer it to cool.

Take of this mixture	1
Of Flux, No. 4	1½

Grind them in water for use.

By varying the proportions of red lead and of antimony, different shades of colour may be obtained.

Another Yellow.

Take three parts by weight of sheet lead and one part of block tin, melt them together in a ladle or a flat shovel, and skim off the top in proportion as it oxidates; when a sufficient quantity is obtained, place it in the muffle in a gentle heat, to reverberate and entirely calcine any remaining particles:

Of which take	7½
Oxide of antimony	1
Litharge	1

Mix

Mix these well together, and give them a red heat in a muffle to bind them together, but not to melt. Use the same flux as for the other yellow.

Orange.

Take red lead	12
Red sulphate of iron	1
Oxide of antimony	4
Flint powder	3

Well mixed in the mortar, and calcined so as to stick together, but avoid melting.

Take of the above	1
Flux, No. 7,	2½

Grind for use.

Dark Red.

Take sulphate of iron calcined dark	1
Flux, No. 7,	3

Grind for use.

Light Red.

Take red sulphate of iron	1
Flux, No. 1.	3
White lead	1½

Grind for use.

Red Brown.

Take brown sulphate of iron calcined dark	1
Flux, No. 1.	3

Grind for use.

Vandyke

Vandyke Brown.

Take Flux, No. 4	3
Iron filings	1

Melted together in a crucible, and drawn out with curling tongs; * with so much metal it will not pour out freely.

Take of the above	5
Black oxide of cobalt	1

Grind for use.

Another Brown.

Take manganese	2¼
Red lead	8½
Flint powder	4

calcined to stick together.

Of this mixture take	1½
Of flux, No. 4, and iron filings melted as above	1½
Flux, No. 4,	1

Grind for use.

Black for painting and mixing with other colours.

Take of umber, broken into small bits and calcined to a yellow heat in a crucible, till quite black, then washed in boiling water and dried, 10

Black oxide of cobalt	10
Blue flint glass	10½
Raw borax	7½
Red lead	12

* In this and in other cases where a muffle is not in readiness, an earthen crucible washed with flint powder inside, or with dry flint powder rubbed inside ¼ of an inch thick, may be used, and the materials when partially melted, so as to stick together, are completely taken out without loss.

Calcine

Calcine these well together and take of it	2
Flux, No. 4,	1

Grind in water for use.

Blacks are compounded in other proportions of these ingredients, and manganese is sometimes substituted in the place of umber.

Another Black.

Take umber calcined black	1
Black oxide of cobalt	1½
Black oxide of copper	½
Flux, No. 4,	3

Grind these in water, and when dried place them on a piece of dutch tile; (washed over with flint-powder ground in water,) in a muffle in a charcoal fire, and calcine them so as to stick together, then add to it one half of Flux, No. 4. Both these blacks if too soft, are hardened by adding a little black oxide of cobalt.

Black for shading and drawing under the Greens.

Take manganese	5
Royal smalt	1

Ground fine in water, and calcined to a high degree of heat in a muffle.

A beautiful Black, for solid grounds or inlaying, but does not mix generally.

Take black oxide of copper	1
Flux, No. 4,	2

Grind in water for use.

A Frit

A Frit for transparent Greens.

Take flint powder	3
Flux, No. 2,	3
Green pot-metal glass	$1\frac{1}{2}$
Red lead	$7\frac{1}{2}$
Raw borax	$2\frac{1}{2}$
Green oxide of copper	$1\frac{1}{4}$

Melt them in a crucible, pour out the mass, and pound it in an earthenware mortar.

Green.

Take of the green frit	3
Of yellow enamel colour made up as before directed	$1\frac{1}{2}$

If too soft add Naples yellow.

Grind in water for use.

Another Green.

Take of green frit	5
Flux, No. 2,	$\frac{1}{8}$
Flux, No. 6,	$2\frac{1}{2}$

Grind in water for use.

Greens in painting on enamel, are formed of various shades by mixing blue and yellow, or blue and orange, &c. in different proportions.

Blue.

Take of black oxide of cobalt	4
Flint powder	9
Nitre	13

Mix them well in an earthenware mortar, and heat them in the crucible, in a strong fire of coke and charcoal, till perfectly

perfectly melted*; then pound the mass, wash it in cold water, and dry it.

Of this take - - 1
Flux, No. 5, - - 1

Grind in water for use.

Another Blue.

Take black oxide of cobalt 1
Raw borax - - - 1

Melt them together.

Of this mixture take - 2
Blue pot-metal glass - 10
Red lead - - - ½

Melt them in a very strong fire. If either blue is too soft, add a little royal smalt; if too hard, a little flux made of blue glass 2, borax 1.

Purple.

Take fine grain gold from the refiners, and dissolve it to saturation in an aqua regia made of strongest

Nitric acid - - 1
Muriatic acid - - 3 } by measure.
Distilled water - - 3

Make the solution in a clean Florence oil flask, placed on sand near the fire. Pour melted tin into cold water, and take of the clean parts of this tin 1

Aqua regia, diluted with water in the same proportion as above - - 4

* If these preparations are not sufficiently fluid in the melted state to pour out of the crucible, the colour will stick to a piece of steel bar when it is warm, and may be drawn out; and sometimes the blues are made in crucibles lined with flint powder as before mentioned.

Place

Place the acid and the tin in a large bason covered with a plate, in a temperate heat; when the tin is all dissolved, add,

Tin - - - - - 1
Strong red fuming nitrous acid 1½

and instantly cover the bason with the plate, to prevent the fumes from escaping. After standing 24 hours, a little distilled water should be poured into the bason. The solution of tin may then be put into a clean phial for use, adding to it a few grains of tin; examine it after four or five days, when the solution, if carefully made, will be of a fine and clear dark colour, and fit to make the purple with. Then of the solution of gold take sufficient to colour distilled water of a faint straw yellow, and drop gradually into it the solution of tin, and a most beautiful purple precipitate will immediately be formed, which must be thrown as it is made into a large vessel, and two or three pieces of the melted tin should be put at the bottom.

Mix the solution of tin with that of the gold in this manner till the last added drops occasion no turbidness in the liquor; the precipitate is then to be washed in several hot waters, filtered on the blotting paper and canvas, and while in a moist and soft state, mixed with flux, No. 4, finely powdered.

The proportion of flux to the purple precipitate is always various, and is judged of by the mass being of a good rich and dark colour, as the ingredients are ground together on the plate glass. Care must be taken to grind this colour before it gets dry.

Twenty-four grains of gold made into a precipitate in this manner will take two ounces of flux, and this may be a rule to the inexperienced practitioner.

To

Rose Colour.

To a saturated solution of gold in aqua regia (containing twenty-four grains of gold), diluted with 100 times its bulk of warm distilled water, having 20 grains of alum* dissolved in it, add caustic ammonia drop by drop as long as any precipitate is thrown down, which wash in several hot waters.

To 24 grains of gold, precipitated in this manner, put

Flux, No. 4 - -	2 oz.
Flux, No. 3 - -	2 oz.

Mix them together wet, and grind them on a plate glass, adding, by a leaf at a time, 16 leaves of leaf silver; when the whole is ground fine, let it be dried on the glass, scraped off, and put in a bottle for use.

This rose colour grinds of a grey or slate colour, but after being ground, if placed in a muffle and exposed to a gentle heat, it will turn to a red; but it is fit for use in either state.

If too yellow, add a little purple; and if too purple, add more leaf silver.

Another Rose Colour.

Take purple made as before directed	1 oz.
Flux, No. 3 - - -	4
Muriate of silver - -	10 gr.

The latter ingredient is prepared by dissolving silver in aqua fortis, and precipitating it with common salt.

Grind in water for use; if too purple, add more muriate of silver.

* The rose colour is sometimes made without any alum.

Opake

Opake White.

Hartshorn shavings burnt in a crucible, in a charcoal fire, till perfectly white - . - 1
Flux, No. 1 - - 1

Grind in water for use.

Venetian white cake enamel 1
Flux, No. 8 - - ¼

Grind in water, then calcine them together in a muffle.

Flux, No. 2, pounded and washed, then dried and calcined in a muffle.

It would not be difficult to exhibit a multitude of specimens of different tints, and fill a volume with descriptions of them, by combining these original enamel colours in various proportions: this, however, may safely be left to the taste and experience of the artist. My object has been to avoid every thing superfluous, and at the same time to explain the processes adapted to immediate practice in terms not liable to be mistaken.

SIR,

WHEN I had the honour of explaining my Treatise on Enamel Colours to the gentlemen forming the Committee of Chemistry, I was requested by them to produce the method of *staining glass*, with a view of adding it as a second part to the Treatise on Enamel Colours.

I have inserted the most valuable information which I possess on this subject in the paper that accompanies this letter, and

and request that you will present it in my name to the Society of Arts.

I am, Sir,
Your most obedient humble Servant,
ROBERT WYNN.

No. 7, Taylor's-Buildings, May 6th, 1817.

To A. Aikin, Esq. Sec.

The Art of staining Glass.

In *coloured glass*, the whole body of the material is tinged throughout by means of some colouring ingredient uniformly diffused through, or dissolved in, the substance of the glass.

In *enamelling*, the colours, being ground up with an easily vitrifiable flux, are laid on the surface of metal, or porcelain, or glass, and are then exposed to such a degree of heat as shall just melt the enamel, and then fix it on the surface of the substance on which it has been applied.

In *staining glass*, the colouring ingredients are mixed with water, or some other fluid vehicle, by means of which they are spread over the surface of a plate of glass, and when dry, are exposed to such a degree of heat as by experience has been found to be sufficient. The colour is then rubbed off from the surface of the glass, to which it does not adhere, and those parts of the plate which have been thus covered are found to have acquired a permanent and transparent tinge or stain, doubtless from some particles of the colour having been absorbed, and fixed in the pores of the glass.

In all the compositions for staining glass, silver, in some form or other, enters as an essential ingredient; I shall there-

fore begin by describing the different preparations of silver that I make use of.

Take two or three ounces of pure nitric acid, dilute it with three times its bulk of distilled water, put it into a Florence flask, or any other convenient glass vessel, and add to it refined silver, by small pieces at a time, till the acid, though kept at a warm temperature, refuses to dissolve any more. After standing quiet for some hours, pour off the clear liquor into a clean ground stoppered phial, and label it nitrate of silver.

Preparations of Silver.

No. 1. Dissolve common salt in water, and add nitrate of silver, drop by drop, till it ceases to occasion any precipitate; there will thus be obtained a heavy white curd-like substance, which must be well washed in hot water, and dried; by exposure to light, it becomes of a dull purple colour. It is known by the name of muriate of silver, or *luna cornea.*

No. 2. Dissolve subcarbonate of soda in water, and add nitrate of silver, as above described. The white precipitate thus obtained, when washed and dried, is ready for use. It is called carbonate of silver.

No. 3. Dissolve subcarbonate of potash in water, and proceed precisely as directed for No. 2. The white powder thus obtained is also carbonate of silver.

No. 4. Dissolve phosphate of soda in water, and proceed as already mentioned. The precipitate thus obtained is of a yellow colour, and is called phosphate of silver.

No. 5. Take any quantity of pure silver rolled out into thin plates, and put it into a crucible, together with some sulphur.

phur. When the crucible has been a short time on the fire, the sulphur will first melt, and then will gradually burn away with a blue flame. When the flame has ceased, add some more sulphur, and proceed as before; then take the silver out, and heat it red in a muffle; it will now be white, and very brittle, and, after having been reduced to powder in a mortar, is fit for use.

No. 6. Take any quantity of a dilute solution of nitrate of silver, and put into it a stick of metallic tin, warm it a little, and the silver will be precipitated in the form of metallic leaves on the surface of the tin. Scrape it off, wash it in warm water, dry it, and grind it in a mortar.

No. 7. Take any quantity of nitrate of silver, and put into it a piece of copper-plate; then proceed precisely as in No. 6.

The foregoing preparations of silver mixed with other ingredients, in the proportions about to be described, compose all the varieties of pigment which are requisite for staining glass.

Yellow.

Take silver, No. 2,	1	part.
Yellow lake -	1	

Mix the ingredients, and grind them well with oil of turpentine mixed with the thick oil of turpentine; lay it on thin.

Take silver, No. 1, - - -	1	Parts.
White clay, precipitated from a solution of alum by subcarbonate of soda - - - - -	3	
Oxalate of iron, prepared by precipitating a clear solution of sulphate of iron by oxalate of potash	3	
Oxide of zinc -	2	

Let the silver be ground first in water with the oxide of zinc, and then with the other ingredients. This is intended for floating on thick.

Take silver, No. 3, 1
Yellow lake 1 } Parts.

Grind them in spirit of turpentine and oil, and lay the mixture on very thin.

Take silver, No. 4, - - 1
Yellow lake, - - 1 } Parts.
White clay, - - ½

Grind them in spirit of turpentine and oil, and lay the mixture on thin.

Orange.

Take silver, No. 6, - - 1
Venetian red and yellow ochre, equal parts, washed in water, and calcined red - 2 } Parts.

Grind the ingredients in spirit of turpentine, with thick oil of ditto, and lay the mixture on thin.

Take silver, No. 7, - - 1
Venetian red and yellow ochre 1 } Parts.

Grind in turpentine and oil, &c. as the foregoing. If entire panes of glass are to be tinged orange, the proportion of ochre may be greatly increased. The depth of the tinge depends in some measure on the heat of the furnace, and on the time that the glass is exposed to it, which, though easily learned by experience, cannot be made the object of precise rules.

Red.

Red.

Take silver, No. 5, - - -	1	Parts.
Brown oxide of iron prepared by heating scales of iron, then quenching them in water, reducing them to a fine powder, and lastly calcining it in a muffle - - -	1	

Grind the ingredients with turpentine and oil, and lay the mixture on thick.

Take of antimonial silver, prepared by melting together one part of silver, and two ditto of crude antimony, and pulverizing the mass - -	1	Parts.
Colcothar - - -	1	

Grind the ingredients in turpentine and oil, and lay the mixture on thick.

Take antimonial silver, prepared as above,	1	Parts.
Venetian red, and yellow ochre, of each, - - - - - -	1	

Grind, &c. as before mentioned.

When whole panes of glass are to be tinged, the proportions of ochre or of colcothar may be much increased, and the ingredients should be ground in water.

Of laying on the Colour

The method practised by most stainers of glass is to draw the outline in Indian ink, or in a brown colour, ground with turpentine and oil, and then to float on the colour thick, having previously ground it with water. But

in this way of proceeding it is very subject either to flow over or to come short of the outline, and thus render the skill of the draftsman of little effect.

My method is to draw the pattern in Indian ink, and having ground the colour as fine as possible in spirits of turpentine, brought to a proper consistence with thick oil of turpentine, to add a little oil of spike lavender, and to cover the outline entirely with this composition.

When it has become dry, I work out the colour with the point of a stick and a knife from those parts that are not intended to be stained, and am thus enabled to execute the most delicate ornaments, and most intricate designs, with exactness and precision.

If the colour is required to be laid on so thick that the outline would not be visible through it, let the colour be first laid on as smoothly as possible, and when it has become dry draw the outline upon it with vermillion water-colour, and work out the design as before.

Besides the precision acquired by the above method, it enables the artist to apply different shades in the same design; whereas the old method of floating only communicates an uniform tint to the whole pattern.

The artist should contrive to charge his furnace with pieces the colour of which is ground in the same vehicle, and not to mix in the same burning some colours ground in turpentine and others ground in water. The pieces must also be very carefully dried, and must be placed in the furnace when this latter is moderately warm.

To gild Glass.

Take of fine gold in grains 1½
of pure mercury - 8 } parts.

Warm

Warm the mercury and then add the gold, previously making it red hot. When the gold is perfectly dissolved pour the mixture into cold water and wash it well. Then press out the superfluous mercury through linen or soft leather, and the mercury which runs through (as it retains some gold) should be reserved for the next opportunity.

The amalgam which remains in the leather is to be digested in warm aqua fortis, which will take up the mercury, but will leave the gold in the form of an extremely fine powder. This powder, when washed and dried, must be rubbed up with one-third of its weight of mercury; then mix 1 grain of this amalgam with three grains of gold flux (see the former part of this paper, p. 63), which is to be applied in the usual manner.

FIFTEEN GUINEAS *were this Session voted to Mr.* JAMES CALLENDER, *of King's Head Court, Holborn, for a Method of seasoning Mahogany. The following Communications were received from him on the subject, and Specimens of the Mahogany seasoned after his Plan are preserved in the Society's Repository.*

SIR,

I TAKE the liberty of submitting to the consideration of the Society of Arts a method of seasoning mahogany plank in a few hours, which hitherto has not been done in less than a year.

The importance of this method is considerable: in the first place a considerable part of the capital which is invested in wood lying to season, during many months, may be saved.

In the second place, as none of the small stuff, from two to six inches thick, is ever seasoned, according to the usual course of trade, all articles made of such wood, such as chairs, ballustrades, &c. must necessarily be excessively subject to warp, which is prevented by adopting my expeditious mode of seasoning. The following is the method I make use of. Having provided a steam-tight wooden box capable of holding conveniently such pieces of mahogany as are fit for chairs, &c. I adapt to it a pipe from a boiler, by means of which I fill the box (after the mahogany has been put into it) with steam, the temperature of which is about equal to that of boiling water.

The time required for inch and a-half wood is about two hours, and pieces of this thickness will become sufficiently dry to work after being placed in a warm room or workshop for 24 hours.

The wood by this treatment is somewhat improved in its general colour, and those blemishes which are technically called *green veins* are entirely removed.

It is also obvious, that the eggs or larvæ of any insects which may be contained in the wood, will be destroyed by the heat.

I have myself made use of the method described for a year and a-half, and Mr. Dalziel, 26, Great James-street, Bedford-row, and Messrs. Gee and Hole, King-street, Holborn, have, by my advice, used the same practice with good success.

I am, Sir,
Your very humble Servant,

JAMES CALLENDER.

16, *King's-head-court, Holborn-hill.*

To A. AIKIN, Esq. Sec.

Mr.

Mr. DALZIEL and Mr. GEE attended the Committee according to summons, and stated that they had adopted the practice of steaming mahogany as communicated to them by Mr. Callender, and which was in their opinion an original invention of the candidate. They farther said, that they had found by experience, that the method of steaming was an effectual way of seasoning small sized mahogany for chairs and other similar articles, and that mahogany so seasoned did not crack or warp by exposure to heat, a defect that wood, even after being seasoned in the ordinary way, is very liable to.

A piece of mahogany abounding in green veins had been sawn in two, one half had been exposed to steam, the other remained in its original state; the latter of these was declared by the above-mentioned cabinet-makers to be fit only for frame-work, while the former was in their opinion applicable to outside work. The following certificates also were delivered in to the Committee.

CERTIFICATES.

SIR,

You have known me in the wood trade sixteen years. I was twelve years prior to that time in the same trade; but I never heard (either among cabinet-makers, chair-makers, or any other branch in the wood line) of steam being applied either to hard or soft wood, to take out the sap or to season them.

I am, Sir,

Your humble Servant,

THOMAS SADGROVE.

Mulberry-court, Wilson-street, Moorfields,
May 1, 1817.

N. B.

N. B. I think if any thing of the kind had been practised I must have heard of it.

To Mr. C. CALLENDER, &c.

SIR,

I HAVE been upwards of twenty years in the mahogany trade, but never heard of steam being applied for the purpose of drying mahogany.

I am, Sir,
Your most obedient Servant,
M. GILLCOCK.

No. 85, Maid-lane, Bankside, Southwark.

To Mr. CALLENDER, &c.

SIR,

I HAVE been above fifty-five years in the cabinet-making business, having served my apprenticeship to Mr. Seddon, of Aldersgate-street, where there were above 200 men employed in his manufactory; but I never heard of steam being applied for the purpose of drying wood, and should your method answer the purpose, it will be a most valuable acquisition to the trade.

I am, Sir,
Wishing you success,
Your obedient Servant,
GEORGE BIGGS.

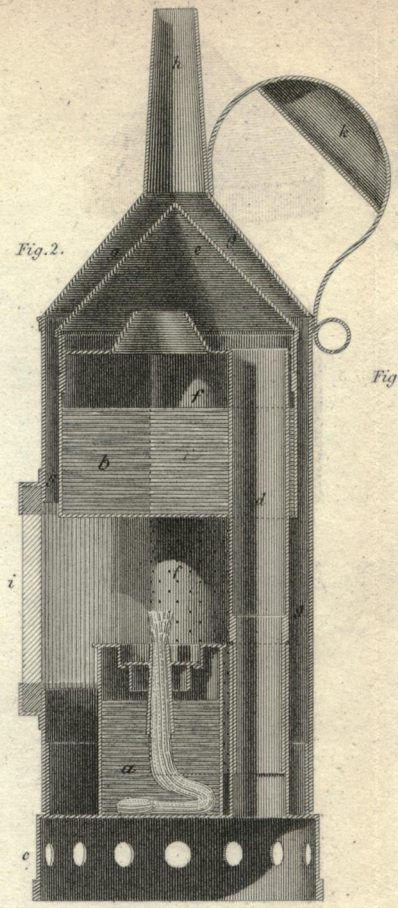
No. 9, Clerkenwell Green.

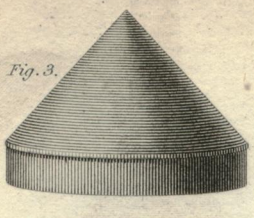
To Mr. CALLENDER, &c.

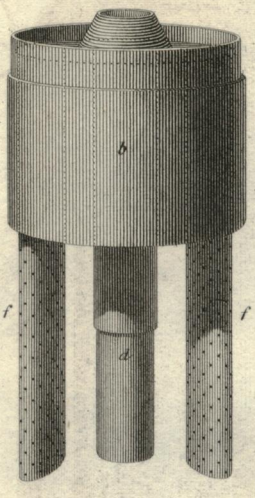
SIR,

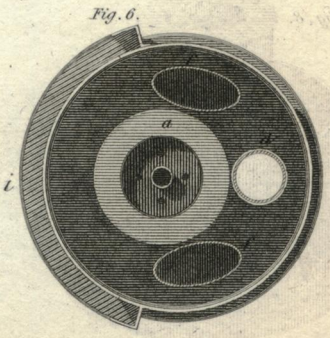
Having seen mahogany dried by steam in your shop, I must

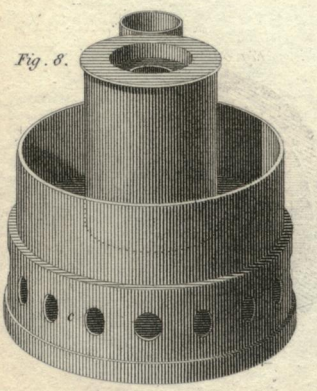
Dr Clanny's Steam safety Lam

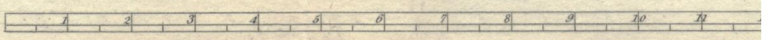






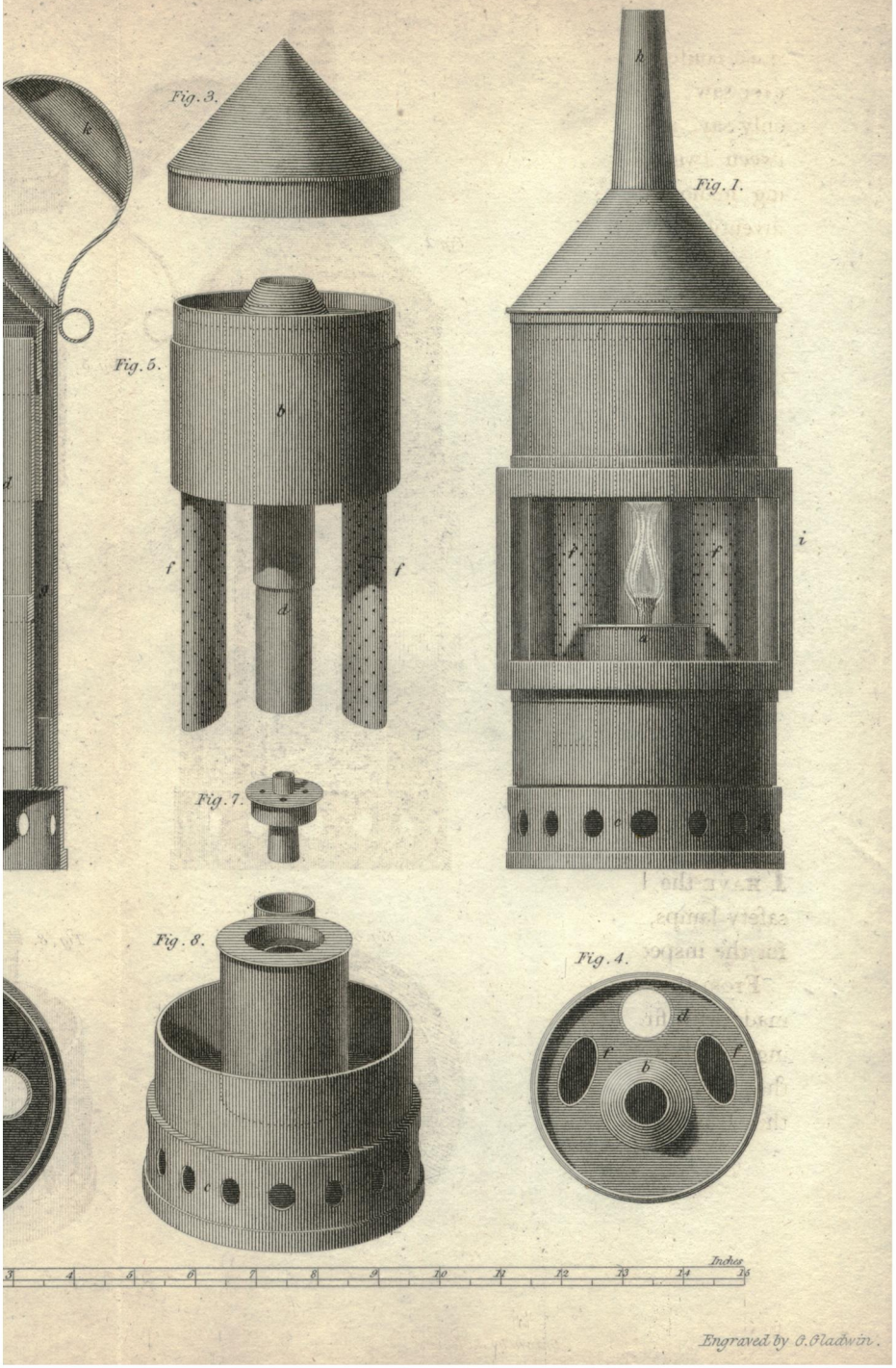






Drawn by J. Clement.

Dr Clanny's Steam safety Lamp. Pl. 1.



must confess that it far excels any way of drying mahogany I ever saw: as regards the originality of the process, I can only say, although I have been in the cabinet business between twenty and thirty years, I never heard of steaming mahogany to dry it, till you informed me of your invention.

I am, Sir,
Your obedient Servant,

HENRY BROWN, Cabinet-maker.

No. 96, Curtain Road, Shoreditch.
May 1, 1817.

To Mr. CALLENDER, &c.

The GOLD MEDAL *was this Session voted to* W. R. CLANNY, M. D. *of Bishopswearmouth, Durham, for a Steam Safety-Lamp. The following Communications were received from him, and one of the Lamps is preserved in the Society's Repository.*

SIR,

I HAVE the honour of transmitting you one of my steam safety-lamps, and a copy of my pamphlet on safety-lamps, for the inspection of the Society of Arts.

From the multiplicity of experiments which I formerly made with fire-damp, upon a large scale, at the neighbouring collieries, I am happy to report to the Society of Arts, that steam is an admirable preventive of explosion; and in this I am corroborated by other experimenters who have lately

lately made similar trials with carbonated hydrogen and steam *.

My steam safety-lamps may be constructed of any size, from eight inches in height, to more than three feet; and, when much light is required the lamps should of course be made large, such as those in use at the Painsher engine-pit, of which some account will be found in the inclosed Certificate of Mr. Wood, the viewer.

In these lamps the steam is constantly extricated, and in considerable quantity, which not only keeps the whole apparatus cool, but is likewise an excellent medium for causing the fire-damp to burn silently, and without explosion at the wick of the oil-lamp, as Mr. Wood has stated in his Certificate: such is the strength of light afforded by these lamps, that it may be thrown to a considerable distance by a mirror or mirrors in those parts of the mine where there may be such a scarcity of oxigen that no light could be supported, and where the pitmen have hitherto carried on their work in darkness, as is often the case in coal-mines. These lamps have given a clear light for sixteen hours, without trimming or a second supply of oil, as the workmen of the Rainton colliery, near the city of Durham, have informed me. I might say much more upon this subject, but shall leave the rest to the investigation of that illustrious body into whose hands I commit the result of much exertion, anxiety, and trouble. Mr. Easton, viewer at Birtley in this county, has authorized me not only to mention his name, but to refer any gentleman to him who may be desirous of ascertain-

* Vide Philosophical Magazine for Dec. 1816; Annals of Philosophy, Vol. 9, p. 152, &c.

ing

ing his opinion of the value of these lamps, which he has had in use under his eye for some time.

I am, Sir,
Your most obedient, very humble Servant,
W. REID CLANNY.

Sunderland, April 2, 1817.

To A. AIKIN, Esq. SEC.

Extract of a Letter addressed to G. D. MIDGLEY, *Esq. one of the Chairmen of the Committee of Chemistry.*

——— I BEG to remark, that the water should be put into the cylinder of the steam safety-lamp at the boiling point, and that the lamp is so constructed, that the flame keeps the water always at the boiling point, and thereby extricates an abundance of steam under all circumstances, as has been clearly proved by the constant use of these lamps at the Painsher engine-pit for several months, and in several other collieries where there are considerable quantities of fire-damp. I acknowledge that I did not anticipate any objection to these lamps on the score of safety, after so many months' severe trials in different highly explosive collieries.

Three months ago, I accompanied Mr. EASTON, an eminent viewer in this county, and a few workmen, into a large cavern of fire-damp, in the Gateshead park colliery, and observed, that the flame of the lamp was silently extinguished by reason of the great quantity of fire-damp, and consequently inferior proportion of atmospheric air which we found in this cavern. After all, should any doubts still remain, I beg to say, that I will myself take my steam safety-lamp into any colliery

colliery in the United Kingdom, let the fire-damp be ever so pure or so great in quantity, at any time and in any manner which may be desired; for such is the value of steam, that in no case and under no circumstances can any accident ever happen from fire-damp, when it is so used as a preventive of explosion.

W. REID CLANNY, M. D.

Sunderland, May 14th, 1817.

CERTIFICATES.

I CERTIFY that fire-damp is frequently discharged at the engine-pit at Painsher colliery, and that no light has been taken into this pit for upwards of two years, till the engine-wright took Dr. CLANNY's original water-lamp into it about eight months ago, which permitted him to examine that pit in every part, and to make his report accordingly. The shaft of this pit now requires to be repaired, and Dr. CLANNY's original safety water-lamp was taken into it, when it burnt very bright for four hours, but the workmen having occasion to come to bank, when they went down with the same lamp again, after using it for about half an hour, the fire-damp exploded within this lamp, and with the greatest safety. The engine-wright took down Sir H. Davy's wire gauze lamp, which he had carefully trimmed with the best oil, and to render the matter as certain as he could, being very desirous of having a light in this pit, he placed the wire gauze lamp in an an old lanthorn (which had the glass taken out) in order to screen it from the wet, and descended the said pit; but the lamp went out, although he took the greatest care possible from his wish to have a light in this pit when at work: the trial was afterwards made in the same way,

way but it turned out equally unsuccessful, so that Sir H. Davy's lamp could not be made to burn in this pit, although the greatest care was taken to make it do so. Dr. CLANNY's steam safety-lamp, in its present improved state, was then tried, which gave the workmen a clear and very brilliant light in all parts of the engine-pit, and for any length of time that they wished; for it has never gone or been put out since they put it to use, and, from the increased size of the flame at the wick of the lamp, which frequently occurs, there is no doubt but it burns the fire-damp, which is of the greatest importance, and, from the steady and permanent light which it affords, the workmen are enabled to get rapidly forward with their work.

JOHN WOOD.

Painsher Colliery, September 10, 1816.

Newbottle Colliery Office, June 3, 1817.

DEAR SIR,

I AM glad to inform you that we have had your steam safety-lamps in use at the above colliery for some time past, and that the head wasteman and others who travel the old working with him are well satisfied with the utility and safety of the same; and also they state to me that they are not afraid to pass through the most inflammable part, should they meet with it in their travels. Likewise they say, the brilliant light which shines from it far exceeds the naked flame of our small candles which we use for working the coals, which makes the said lamp very useful indeed. Also they say, after the wick is lighted it will burn for eighteen

or

or twenty hours without snuffing, or any supply of oil or water to it.

I am, Dear Sir,
Your most obedient Servant,
ANDREW WATSON.

To Dr. CLANNY.

DEAR SIR,

YOUR steam safety-lamp (for the use of coal mines) that I experimented upon answered fully to my expectation; gave a very good light, was in a variety of mixtures of air, which did not at all affect it, until it was immersed in pure carburetted hydrogen, when the light was extinguished.

From the time you made some slight alterations in the lamp, and returned it as a present to the colliery, it has not been tried, the colliery not being in a situation to require the use of any safety-lamp

I remain, Dear Sir,
Your's sincerely,
THOMAS EASTON.

Birtley, June 6, 1817.

To Dr. R. CLANNY.

Reference to the Engraving of Dr. Clanny's Steam Safety-Lamp, Plate 1.

a, The cylinder which holds the oil and the wick. The piece through which the wick passes (fig. 7) is received into the socket of the cylinder, which is purposely made deep, in

in order that as little as possible of the wick may be consumed, and thus the necessity for frequent snuffing may be avoided.

b, The boiler, filled with hot water and kept in a state of ebullition by the heat from the flame of the wick placed directly below it.

c, A row of holes surrounding the base of the lamp, through which the air enters.

d, A cylindrical tube, which conducts the air that has entered through *c* into the cover of the boiler. It supports the boiler, and is composed of two pieces fitting closely on each other, but capable of being separated for the purpose of detaching the boiler with its appendages (fig. 5), in order to fill or empty it.

e, The cover of the boiler, shewn by itself (fig. 3), within which the mixture of the air and steam takes place.

ff, Two tubes passing through the boilers, and perforated at their lower extremities, in order to convey the air mixed with steam into the body of the lamp.

g g, A space between the lamp and its case, through which the air that has been burnt passes into the chimney *h*.

i, The window made of clear glass half an inch thick.

k, The handle.

Fig. 1, is a front view of the lamp, the whole outer case of which is made of strong tinned iron, except the window.

Fig. 2, is a vertical section of the same, at right angles to fig. 1.

Fig. 4, a view of the top of the boiler and its appendages, the cover being removed.

Fig. 6, a horizontal section of the lamp through the middle of the window.

Fig. 8, the cylinder to hold the oil and wick, shewing

the depth of the socket which receives the piece, (fig. 7); behind it is the air tube, *d*.

The SILVER MEDAL *and* TEN GUINEAS *were this Session voted to Mr.* THOMAS STILES, *of Norwich, for his method of preparing an Extract of Sprats. The following Communication was received from him, and Samples of the Preparation are preserved in the Society's Repository.*

DEAR SIR,

THE attention shown by you in the case of my method of curing herrings in 1813, induces me to hope that you will give me an opportunity of presenting before a Committee of the Society an invention which, after much labour, has been crowned with success. I have submitted it to the inspection of competent judges, one of whom is industriously communicating the utility of it to the circle of his acquaintance. My friend, William Spratt, Esq., of the city of Norwich, will have the honour of presenting to you a sample of Essence, liquid and solid, prepared from my cured fish. These articles can be produced in any quantities, should the public receive them with the same avidity as the individuals within the circle of my acquaintance. It is equally suitable for foreign and home consumption, being so highly charged with preservatives as to warrant its keeping in any climate. I need not enlarge on the utility of this invention as you have the article before you, which will plead

plead my cause. The Essence herewith sent is prepared from fish of my curing in November, 1813, which are now as bright as they were on the day of pickling, of which I have several cwt. now by me.

I am, Dear Sir,
With every mark of respect, yours,

THOMAS STILES.

Norwich, September 16, 1816.

To Dr. TAYLOR, Sec.

THE process by which Mr. STILES makes his liquid and solid Essence of Sprats is as follows:

He commences by salting and curing any quantity of sprats, according to the method described in the 31st Vol. of the Transactions of the Society. He then pours the sprats with their liquor into a copper, and brings them to a boiling heat; after which they are put into hair bags and strongly pressed. The liquor thus obtained is put into a vat or any other convenient vessel for a few days, till the oil has risen to the surface; the oil is to be removed very carefully, and the remaining liquor (called by Mr. Stiles *Essence)* will be found to be wholly free from the coarse peculiar flavour of the sprat, and to be scarcely distinguishable from the essence of anchovy.

In order to prepare the solid essence, he takes a quantity of wheaten flour and carefully dries it in a water bath for the space of 60 hours, the lumps being then broken to pieces he mixes it well, by hand, with the liquid essence till the mass is about the consistence of cream, adding at the same time a little bole armenic to give it a red colour. He

then reduces the mass by farther evaporation in a water bath, stirring it constantly with a wooden spatula till it has acquired the consistence of butter; the preparation is then compleat, and is packed in barrels for sale.

Fig. 1.

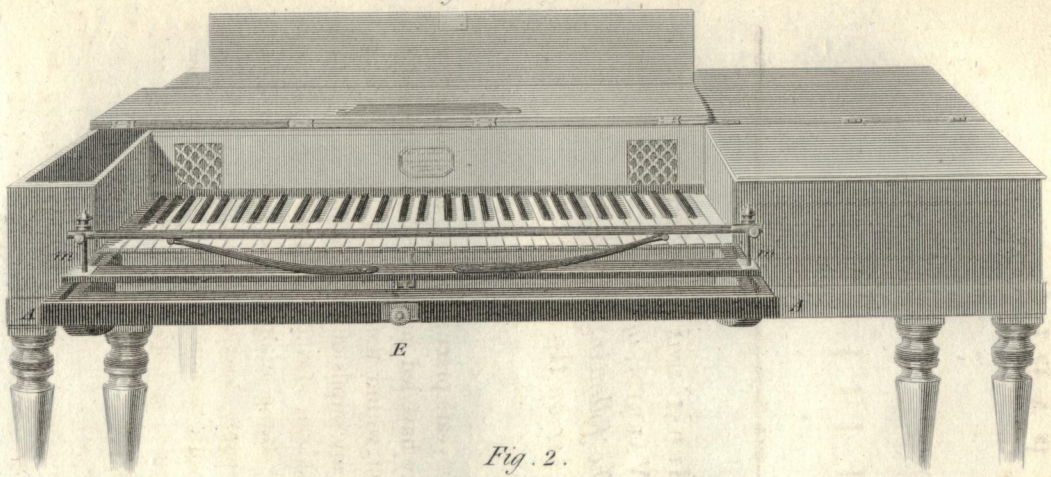
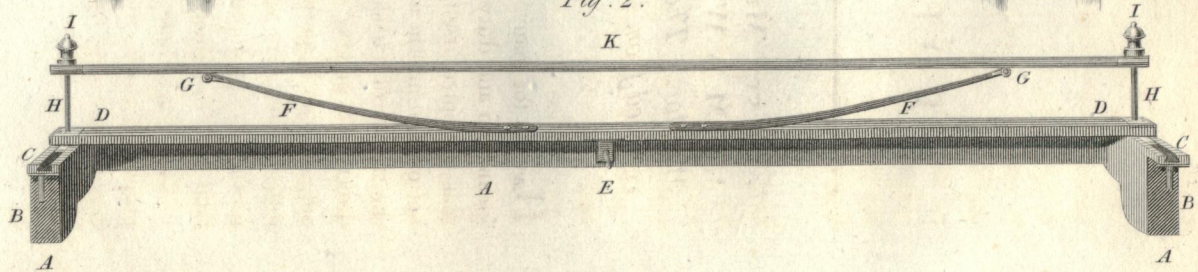


Fig. 2.



Drawn by M.A. Warren

Engraved by A.W. Warren

Mrs. M. A. Warren's Piano Monitor.